

Rupture of the Flexor Digitorum Superficialis at the Musculotendinous Junction Due to a Forearm Fracture: A Case Report

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J Wrist Surg 2013;00:146–147.

Abstract

Keywords

- flexor digitorum superficialis
- musculotendinous junction
- rupture

We present a case of a closed distal-third forearm fracture, in which the flexor digitorum superficialis was found ruptured at its musculotendinous junction. We diagnosed the ruptured tendon during the exploration of the ulnar nerve for observed preoperative palsy. Although there are numerous reports about avulsions at the bony insertions, there are very few about avulsion at the musculotendinous junction in the literature. This consideration leads to the conclusion that this kind of rupture may be more frequent than recognized.

We report a case of a forearm fracture in which the flexor digitorum superficialis (FDS) of the small finger was found to be ruptured at its musculotendinous junction. Although experimental models and studies emphasize that such traumas present with rupture at the musculotendinous junction or at the bony insertion, the literature supports only the latter. Such ruptures of the musculotendinous junction may be misdiagnosed.

Case Report

A 22-year-old male was referred to our clinic for ulnar nerve palsy following closed trauma of the right forearm sustained in a car accident. The injured hand was the dominant one. Radiological evaluation revealed fracture of the distal third of the radius and ulna (► **Fig. 1**). Clinical examination revealed a sensory deficit of the ring and small finger as well as reduced adduction strength (M4) of the thumb. Active flexion of the small finger had reduced strength. The patient underwent open reduction and internal fixation of the radius and ulna. Via the extended anterior forearm approach, we explored the distal half of the ulnar nerve. The ulnar nerve was intact with an epineural hematoma. During exploration of the ulnar

nerve, we found that the FDS tendon of the small finger was avulsed from its musculotendinous junction (► **Fig. 2**). The injury was not a result of a laceration from a bony fragment, considering that the level of the fracture was far more distal than the tendon avulsion. We performed a side-to-side suturing of the ruptured tendon to the FDS of the ring finger in the proper flexion. We must stress that the patient had no underlying pathologies that could have contributed to this tendon rupture.

Six months postoperatively, the patient had clinical and radiological signs of fracture union. Grip strength of the injured hand was 90% and lateral pinch strength was 60% of the contralateral side. Mild hypothenar atrophy was still present. Patient had full range of motion of wrist and digits, no sensory deficit of the small and ring finger, and no claw deformity.

Discussion

In a retrospective analysis of 80 flexor tendon ruptures, it was reported that only eight (10%) occurred on the FDS alone, of which only one case involved the FDS of the small finger and only two cases were located at the musculotendinous



Fig. 1 Preoperative radiograph of the distal third radius and ulna fracture.



Fig. 2 Intraoperative photograph of the distal part of the ruptured tendon.

junction.¹ In an experimental model, it was demonstrated that when normal tendon-muscle systems are subjected to severe strain, the tendon ruptures at its bony insertion, at the musculotendinous junction, at the muscle belly, or at its origin.² Another experimental study³ showed that when animal muscle-tendon units were lengthened to failure, all of them tore at the musculotendinous junction. Although closed avulsion of the flexor tendons at their bony insertion (more frequently the flexor digitorum profundus [FDP], but also the FDS) is commonly reported, closed avulsion at the musculotendinous junction as a result of indirect force is very rarely reported. The mechanism of injury in our case was most likely due to wrist extension and direct force to the FDS tendon by the volar angulation of the distal ulnar fragment, resulting in avulsion of the tendon from its musculotendinous junction. Going through the literature, we have found one

case report⁴ about a rupture of the musculotendinous junction of the FDS to the index finger in a baseball pitcher. There is also a report⁵ of an acute flexor carpi radialis rupture due to distal radius fracture, as well as a report of two cases of delayed rupture of flexor tendons after a distal radius fracture⁶ and a case of flexor digitorum profundus entrapment in the ulna after a both-bones fracture.⁷ It is noted that in the aforementioned cases, the ruptures were a result of direct injury by the bony fragments, which was not the most possible cause in our case. As ruptures of the FDS leave only small functional deficits, they can easily be overlooked in the absence of concomitant injuries that require surgical exploration. High suspicion and thorough clinical evaluation are needed, to rule out FDS rupture at the musculotendinous junction, as it might be more frequent than reported in the setting of high-energy trauma. In the case of injuries that are managed surgically, such as a both-bones forearm fracture, preoperative clinical examination could lead to open inspection of possibly damaged structures through the standard approaches and management of these injuries at the same time.

Location Where the Work Was Performed

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Conflict of Interest

None

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